(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 940 617 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
08.09.1999 Bulletin 1999/36

(51) Int. Cl.[6]: **F16L 19/08**

(21) Application number: **99200517.3**

(22) Date of filing: **24.02.1999**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **05.03.1998 NL 1008491**

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(54) Quick-action coupling system

(57) Quick-action coupling system for connecting a coupling piece (2) or another counterproduct to a pipe end (1), in which a clamping ring provided with internal teeth is present, which clamping ring can be tightened in the axial direction in order to generate a radially inward directed force on the clamping ring.

According to the invention, the clamping ring (12) comprises a casing part which is provided with incisions, known per se, running in the axial direction from the end facing away from the end of the pipe, and with a series of sharp teeth, running in the peripheral direction, on the ends of the lips formed by said incisions.

This makes the system suitable for flexible hoses of the type with a spiral-shaped hard reinforcement, sheathed with soft plastic, in the case of which a spiralshaped groove is produced on the outside.

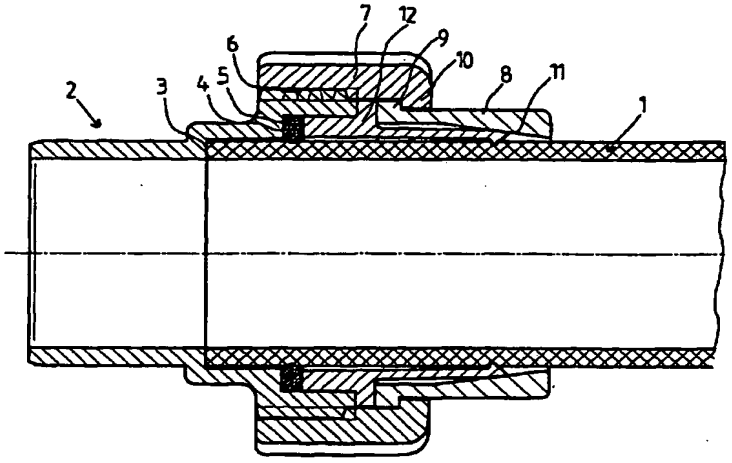

Fig. 1

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Description

[0001] The invention relates to a quick-action coupling system for connecting a counterproduct such as a coupling piece to a pipe end, in which the counterproduct is provided with an internal chamber, and in which a clamping ring for placing around the pipe is present, which clamping ring is provided with internal teeth having a substantially radially inward directed front face which is situated on the side facing the end of the pipe to be connected or facing the counterproduct respectively, while the rear face of said teeth forms an angle with the radial direction, and which teeth are designed to act upon the pipe surface, which clamping ring is further provided with an external face, with which a pressure element which has an internal face and can be tightened by screw action in the axial direction relative to the counterproduct interacts, of the abovementioned external face and the abovementioned internal face at least one being conical, in order to generate a radially inward directed force on the clamping ring, and in which further the chamber of the counterproduct forms a shoulder against which a sealing ring ultimately rests.

[0002] Such quick-action coupling systems are commercially available. They are suitable, for example, for PE pipes in both water and gas mains. They are made of metal (bronze). They are very satisfactory, and they are, inter alia, resistant to great stresses.

[0003] Polyethylene couplings for PE pipes are also known, and furthermore also, of course, quick-action coupling systems of more or less comparable design which are intended for metal pipes.

[0004] There is not a good quick-action coupling system for flexible hoses comprising a spiral-shaped reinforcement of rigid PVC, sheathed with soft PVC. These couplings would have to be glued, but glue dissolves the plasticizer used, and such connections become detached under pressure. Existing quick-action coupling systems generally produce a seal only on pipes or hoses with a smooth external surface, and they do not do so if there is a spiral-shaped groove on that external surface as a result of the spiral-shaped internal reinforcement, while the deliberately created flexibility of such a hose in that case also has a loosening effect on the grip of the coupling.

[0005] The object of the invention is to provide a solution to this problem and to propose a quick-action coupling system which is suitable for hoses of the type in which a spiral-shaped reinforcement is sheathed with soft plastic.

[0006] To this end, the system according to the invention is characterized in that the clamping ring comprises a casing part which is provided with incisions, known per se, running in the axial direction from the end facing away from the end of the pipe, and with a series of sharp teeth, running in the peripheral direction, on the ends of the lips formed by said incisions.

[0007] In this way it is ensured that the teeth of the clamping ring can engage so deeply in the soft outer material of the hose that in doing so they are not hampered by the spiral-shaped groove on the external surface.

[0008] In order to be able to determine the correct end position of the clamping ring, the procedure is preferably such that the clamping ring is provided with a moulded-on flange ring on the outer periphery, designed for ultimately resting against an end face of the counterproduct outside the internal chamber.

[0009] In this case a pressure ring would then also be needed, for correctly determining the position of the O-ring serving as a seal. That can be prevented if the abovementioned flange ring is situated at a distance from the end face of the clamping ring on the side of the end of the pipe, in such a way that the part of the clamping ring situated in front of it can ultimately rest, in the chamber in the counterproduct, against the sealing ring.

[0010] The pressure element could be made of a single part, which by rotation would then have to generate the radial clamping force of the clamping ring. In order to prevent that, it is advantageous if the pressure element is in the form of a clamping bush which has the abovementioned conical internal face, and has a union nut which engages behind a flanged edge and can be screwed onto screw thread on the counterproduct. In a manner which is otherwise known per se, it is then ensured that the clamping bush does not rotate, but only shifts axially, so that in this way, as a result of the one conical face present, it exerts a radially inward directed force component on the ribs or teeth.

[0011] The invention will be explained below with reference to the appended drawing of an exemplary embodiment.

Fig. 1 shows an axial section through the coupling, in the state in which it has been fitted on the end of a hose, in order to connect the latter to a counterproduct in the form of a short pipe stub;
Fig. 2 shows a view towards the clamping ring in the direction of the arrow II in Fig. 3;
Fig. 3 shows an axial section of the clamping ring, while
Fig. 3a shows the detail A in Fig. 3 on a larger scale.

[0012] Fig. 1 shows the pipe end 1, connected to a counterproduct 2, which in this case is in the form of a short pipe stub, but which may be any coupling piece, elbow, T-piece, bend, diameter adapter etc.

[0013] The counterproduct 2 is formed in such a way that an internal chamber is formed by a first shoulder 3, by means of which an internal diameter is produced for the accommodation of the end of the hose, and a second shoulder 4, which forms a bearing face for an O-ring 5, the chamber acquiring a larger internal diameter in which a component of a clamping ring, yet to be discussed, can be accommodated.

[0014] External screw thread 6 is provided, with which thread a union nut 7 interacts, fulfilling an axially tightening function relative to a clamping bush 8, which for this purpose is, of course, provided in a manner known per se with an external flange 9, which is gripped by an internal flange 10 of the union nut or screw nut 7.

[0015] Clamping bush 8 is provided internally over part of its length with a conical face 11, which tapers in the direction facing away from the end of the hose to be inserted.

[0016] Clamping bush 8 holds clamping ring 12 in position, the details of which ring will be described with reference to the figures which follow.

[0017] As can be seen from Fig. 3, the clamping ring 12 is substantially cylindrical. The body part 13 on the left in the figure, being the part which faces the end of the hose 1 to be coupled, extends to the end of the flange ring 14.

[0018] Abutting it is a casing part 15 of lower thickness, i.e. radial dimensions, than the body part 13, and being internally cylindrical, with the same diameter as that of the body part 13 at the position of the transition to said casing part 15.

[0019] Said casing part 15 is provided with axial incisions 17 along its full length, i.e. up to the point where the body part 13 begins, eight incisions being provided in the preferred embodiment shown. This produces eight lips, such as 18.

[0020] At their free ends, i.e. the ends facing away from the body part 13, all lips are provided with teeth 19 which are directed inwards, so that they face the central axis. The shape of the teeth can be seen from the enlarged detail of Fig. 3a. The front face 20 is directed radially inwards from a transition 21 towards the inner peripheral face of the casing 15 or the tooth 19. A short backward running flat part 23, which can be called a cutting face, connects with a sharp transition to said front face. It connects at an angle of preferably 75° (see Fig. 3) to the front face 20. This is followed by a face 24 which has a slightly larger angle of gradient relative to the axial direction, namely preferably 45°. The end edge 25 need not be sharp, because it fulfils no function. Beyond it, on the outside of casing part 15 or side 18, is a conical flat part 26, which preferably forms an angle of 8° with the axial direction, and which further connects to the undeformed external face 27 of casing part or tooth.

[0021] The material of the clamping ring 12 is preferably acetal copolymer (known as POM), which combines good mechanical strength properties with a slight degree of flexibility. The remaining parts can be made of rigid PVC.

[0022] It would be conceivable to make the clamping ring in two parts, namely a part corresponding to what is now called the body part 13 with the flange ring 14, and, on the other hand, a part which is in the form of the casing part described, in which the lips are formed. The casing part would then have to be slightly longer, while the lips would have the same axial length, because said lips must, of course, remain connected by an annular part. In the case of the single-part embodiment illustrated and described, the incisions 17 can run through to the material mass of the body part 13. The union nut and the clamping bush could also be combined to form one screw part.

[0023] For the fitting, the procedure is as follows:

[0024] First, the clamping bush 8 and the union nut 7 are pushed some distance onto the hose 1. Clamping ring 12 and O-ring 4 can then be pushed some distance onto the end of the hose 1 to be connected, and thereafter the combination is pushed into the chamber in the counterproduct 2. The same situation can be achieved by first inserting the O-ring 4 in the chamber and then pushing in the other two parts, or by pushing both the O-ring and the clamping ring into the chamber and then inserting the end of the hose, the latter, of course, knocking against the shoulder 4 on the end of the chamber.

[0025] During the tightening of the union nut 7 on the external screw thread 6 of the counterproduct 2, the end of clamping bush 8, owing to the fact that its flanged edge 9 is taken along by the inward directed flanged edge 10 of the union nut, will press the clamping ring 12 with its flanged edge 14 against the end face of the counterproduct 2, with the result that the correct space is automatically produced for the O-ring 4.

[0026] During the axial displacement of clamping bush 8 thus caused to the left in Fig. 1, its internal conical face 11 will come into contact with and glide over the short conical face 26 on the outside of the teeth 18. As a result of the angle of these faces relative to the axial direction, a small radially inward directed force component is produced, as is known, on the lips 18, which will ensure that the teeth 19 engage firmly in the material of hose 1.

[0027] At a point along the periphery, one or two adjoining teeth will then encounter a point where at the very small pitch angle of the spiral winding forming the reinforcement of a hose they cross a peripheral groove, so that they will not be able to gain a direct grip on the material. The specified tooth dimensioning is, however, still suitable for making the teeth grip so deeply in the hose material that the grip at that point also is sufficient to prevent the coupling from being pulled out of alignment, and possibly becoming detached.

[0028] Although the quick-action coupling system according to the invention is designed to solve the problem which occurs because of the spiral-shaped groove in the case of hoses formed with an internal spiral-shaped reinforcement, sheathed with soft plastic, the quick-action coupling designed to solve this problem is also suitable for use in the case of other pipes and hoses made of plastic.

Claims

1. Quick-action coupling system for connecting a

counterproduct (2) such as a coupling piece to a pipe end (1), in which the counterproduct is provided with an internal chamber, and in which a clamping ring (12) for placing around the pipe is present, which clamping ring is provided with internal teeth having a substantially radially inward directed front face which is situated on the side facing the end of the pipe (1) to be connected or facing the counterproduct (2) respectively, while the rear face of said teeth forms an angle with the radial direction, and which teeth are designed to act upon the pipe surface, which clamping ring (12) is further provided with an external face (26), with which a pressure element which has an internal face and can be tightened by screw action in the axial direction relative to the counterproduct (2) interacts, of the abovementioned external face and the abovementioned internal face at least one being conical, in order to generate a radially inward directed force on the clamping ring, and in which further the chamber of the counterproduct forms a shoulder (3) against which a sealing ring (4) ultimately rests, characterized in that the clamping ring (12) comprises a casing part (15) which is provided with incisions (17), known per se, running in the axial direction from the end facing away from the end of the pipe (1), and with a series of sharp teeth (19), running in the peripheral direction, on the ends of the lips (18) formed by said incisions (17).

2. Quick-action coupling system according to claim 1, characterized in that the clamping ring (15) is provided with a moulded-on flange ring (14) on the outer periphery, designed for ultimately resting against an end face of the counterproduct (2) outside the internal chamber.

3. Quick-action coupling system according to claim 2, characterized in that the abovementioned flange ring (14) is situated at a distance from the end face of the clamping ring (12) on the side of the end of the pipe (1), in such a way that the part of the clamping ring situated in front of it can ultimately rest, in the chamber in the counterproduct (2), against the sealing ring (4).

4. Quick-action coupling system according to one of claims 1 to 3, characterized in that the pressure element is in the form of a clamping bush (8) which has the abovementioned conical internal face (11), and has a union nut (7) which engages behind a flanged edge (9) and can be screwed onto screw thread (6) on the counterproduct (2).

5. Quick-action coupling system according to one of claims 1 to 4, characterized in that the teeth behind the radially inward directed front face (20) have a "cutting face", consisting of two parts (23, 24) with differing angles of gradient relative to the axial direction.

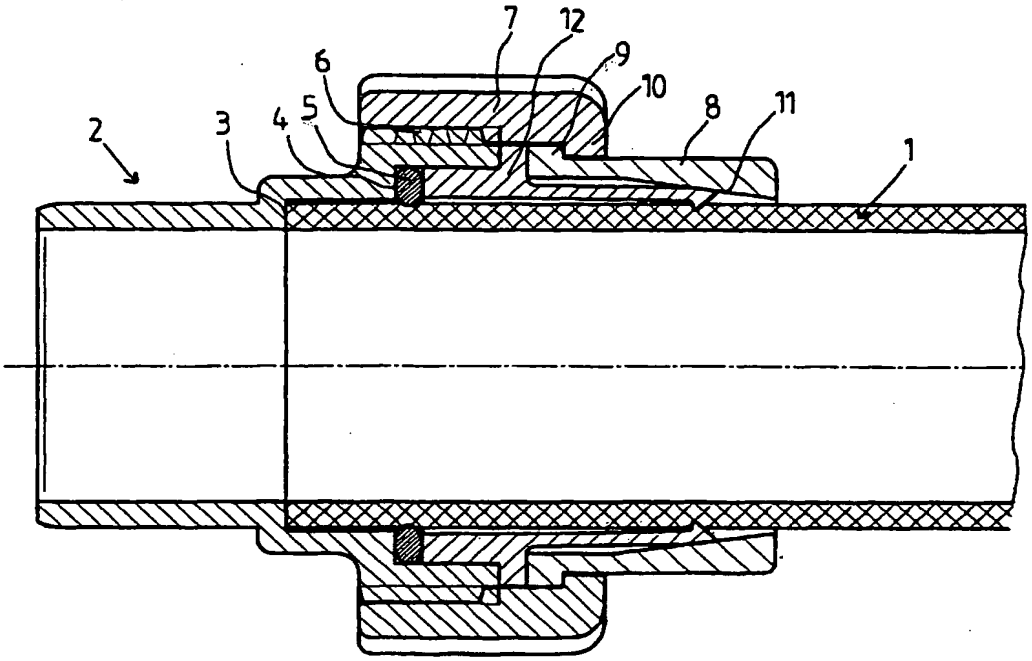

Fig. 1

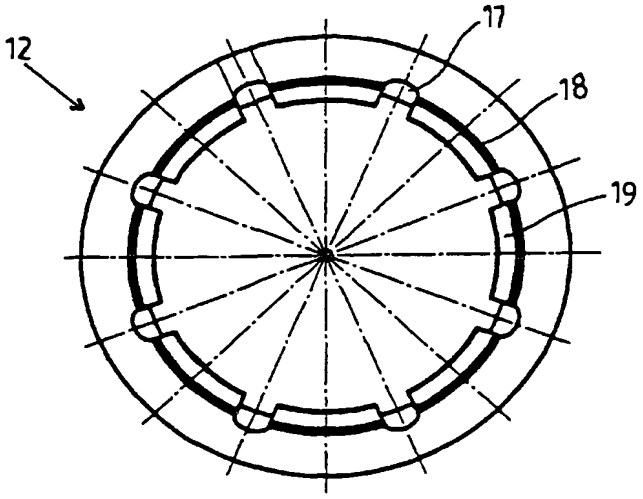

Fig. 2

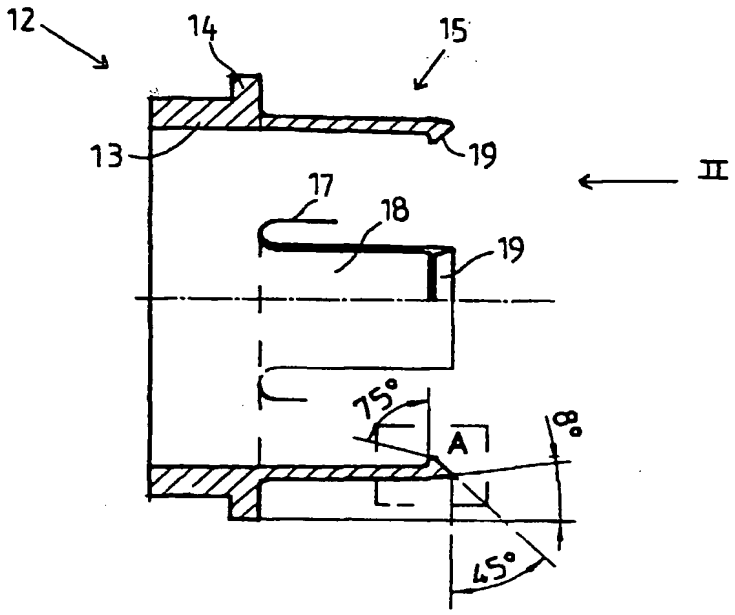

Fig. 3

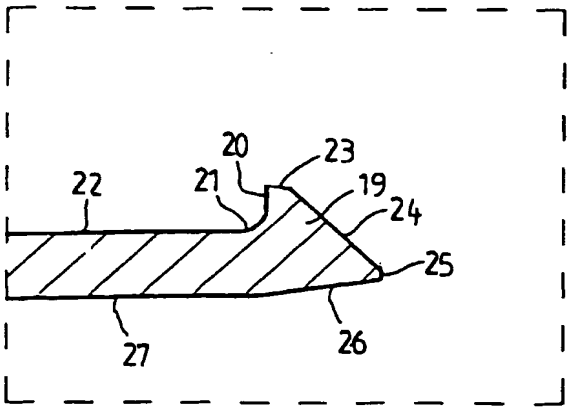

Fig. 3a